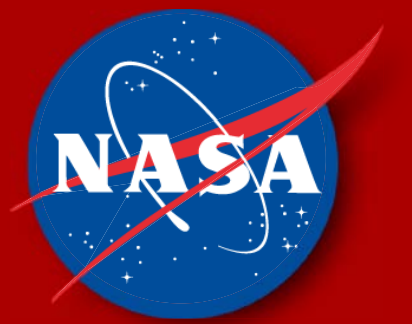




# Improvements in X-ray Spectrometry for Planetary Surface Exploration



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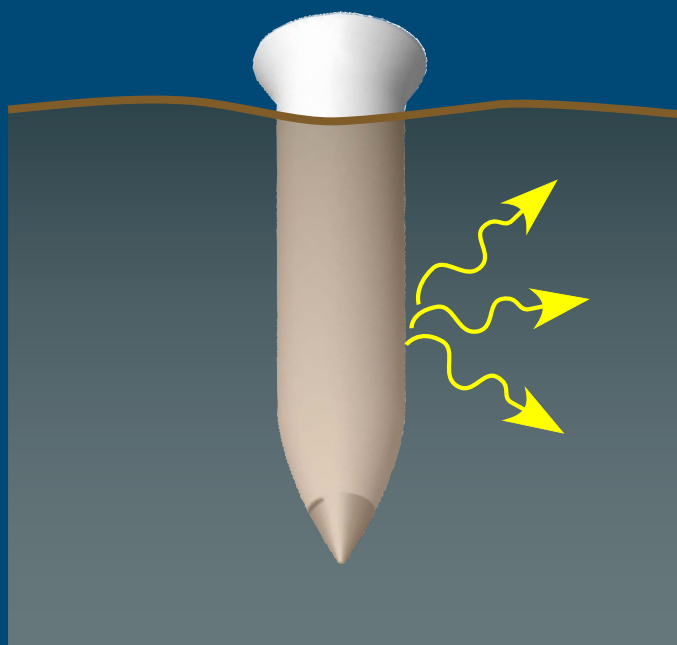
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## ABSTRACT

Recent innovations in X-ray instrumentation have enabled a new generation of planetary XRS instruments exhibiting performance matching terrestrial laboratory results.

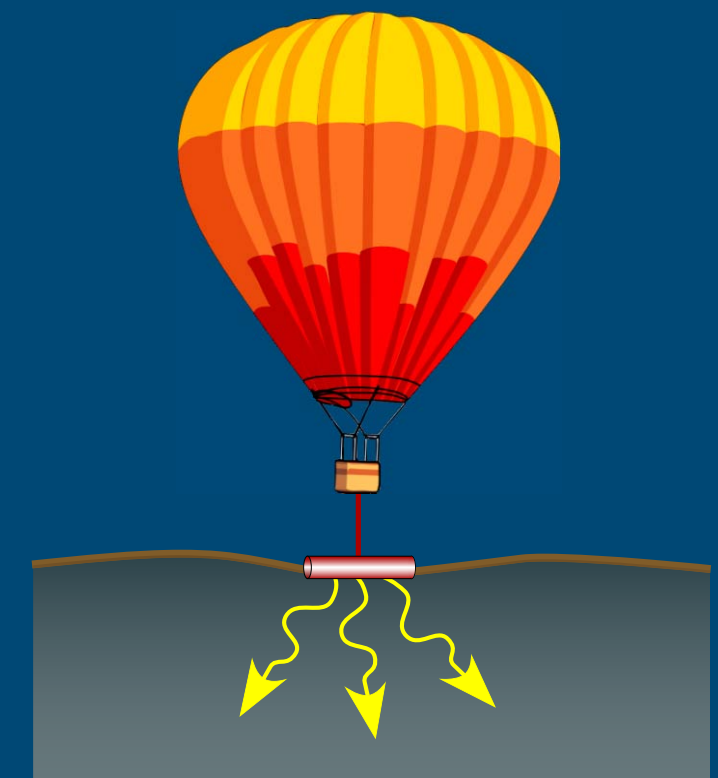
### Miniature X-ray Tubes

- Much higher output
- Control of excitation
- Low power (1 watt)
- Rugged



### Silicon Drift Detectors

- High count rates
- Can operate at room temperature (and above)
- Light element sensitivity

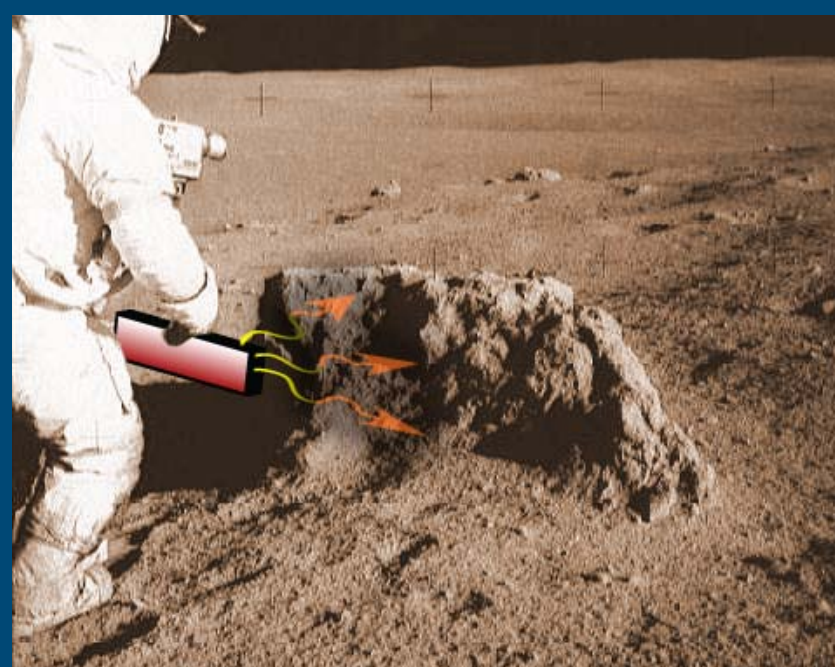


### Performance

- ppm detection of trace elements
- Wide element coverage (C to U)
- Adaptable to difficult environments
- Light-element info from scatter
- Reduced mass/power/volume

### Applications

- Penetrators
- Touch-and-go probes
- Astronauts
- Process control
- In situ / boreholes
- Analytical laboratories



### Window Materials

- Thinner window materials allow detection of light element X-rays
- Rugged window materials allow operation at high pressures, in corrosive atmospheres, and via direct push in to subsurface regolith

### Digital Pulse Processing

- Short shaping times
- Optimal pulse shape
- Excellent pileup rejection
- Reduced mass and power
- Can be integrated with control and comms